HY-2 Series Satellite Status and Future Plans

National Satellite Ocean Application Service
P. R. China

26 May 2020

Outlines

Backgrounds & Current Status

Future Plans

Backgrounds

- National Satellite Ocean Application Service (NSOAS) of China owns three series of Haiyang satellites

HY-1	Ocean Color Satellite Missions
HY-2	Ocean Dynamic Environment Satellite Missions
HY-3	Ocean Surveillance Satellite Missions

FYI, the “HY” denotes “HaiYang” which means “ocean” in Chinese.

Current Status

❖ Ocean Dynamic Environment Satellites (HY-2)

- Objective
  - Globally monitoring ocean dynamic environment parameters in the microwave region, including ocean surface winds, sea surface height, significant wave height and sea surface temperature, etc.
- Launched Satellites

Satellite	Launched date	Design Life	Nature	Status
HY-2A	Aug. 16, 2011	3 years	Experimental	In orbit
HY-2B	Oct. 25, 2018	5 years	Operational	In orbit

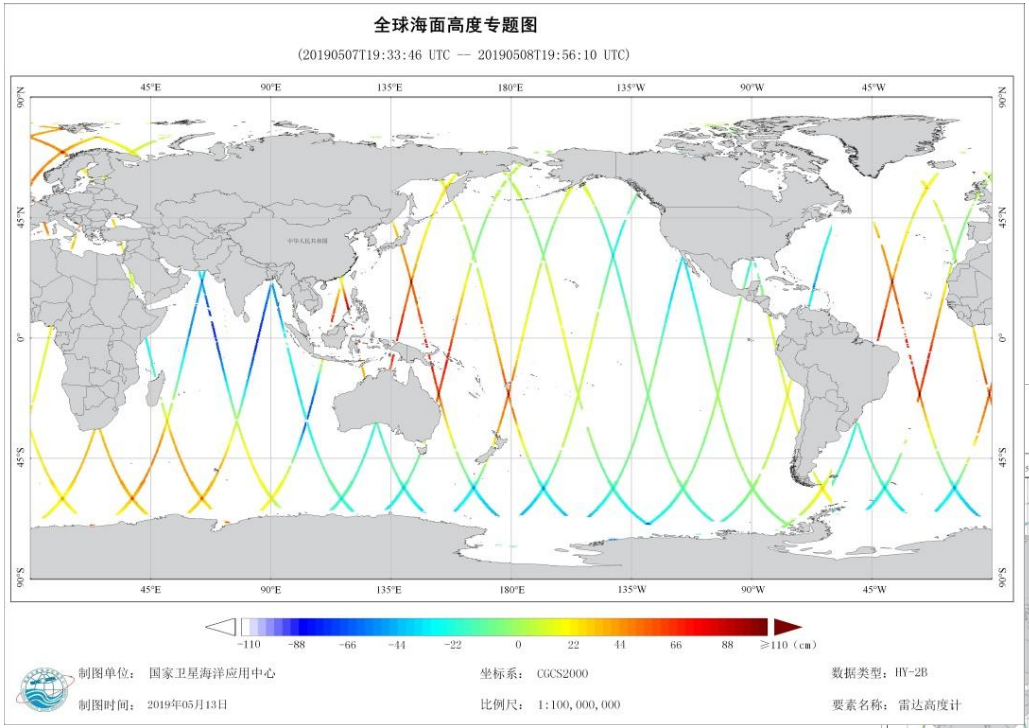
Current Status

- Sensors

Satellite	Sensors	Frequency Bands (GHz)
HY-2A HY-2B	Radar Altimeter (ALT)	13.58, 5.25 (C and Ku Bands)
	Microwave Scatterometer (SCA)	13.256 (Ku Bands)
	Scanning Microwave Radiometer (SMR)	6.6(6.925), 10.7, 18.7, 23.8, 37.0
	Calibration Microwave Radiometer (CMR)	18.7, 23.8, 37.0

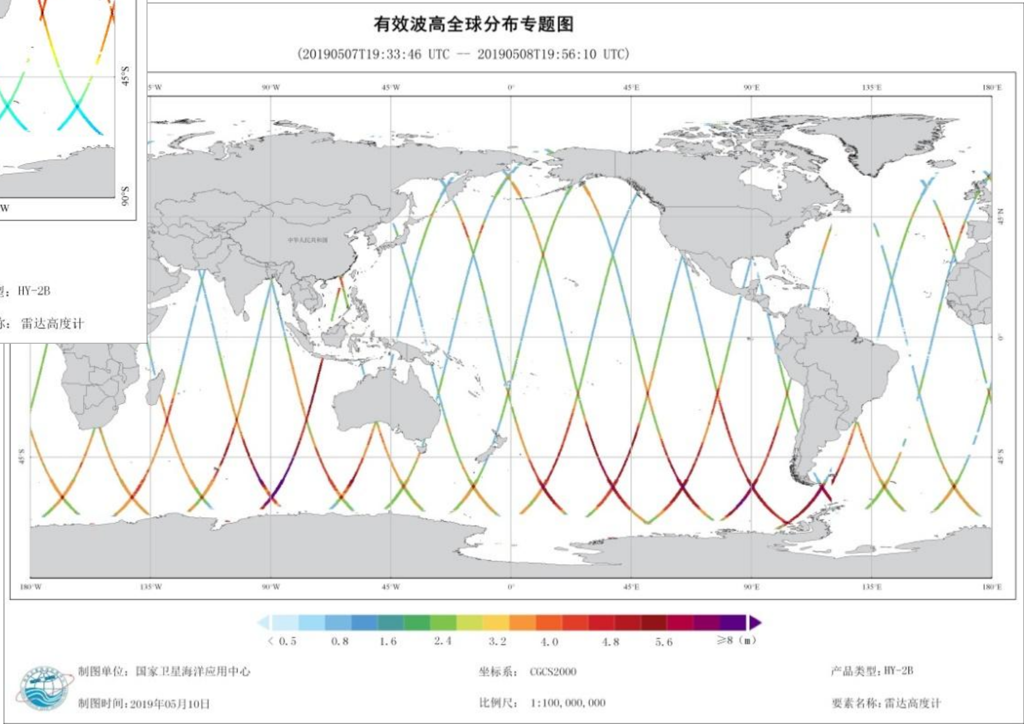
Current Status

- Example products of Radar Altimeter



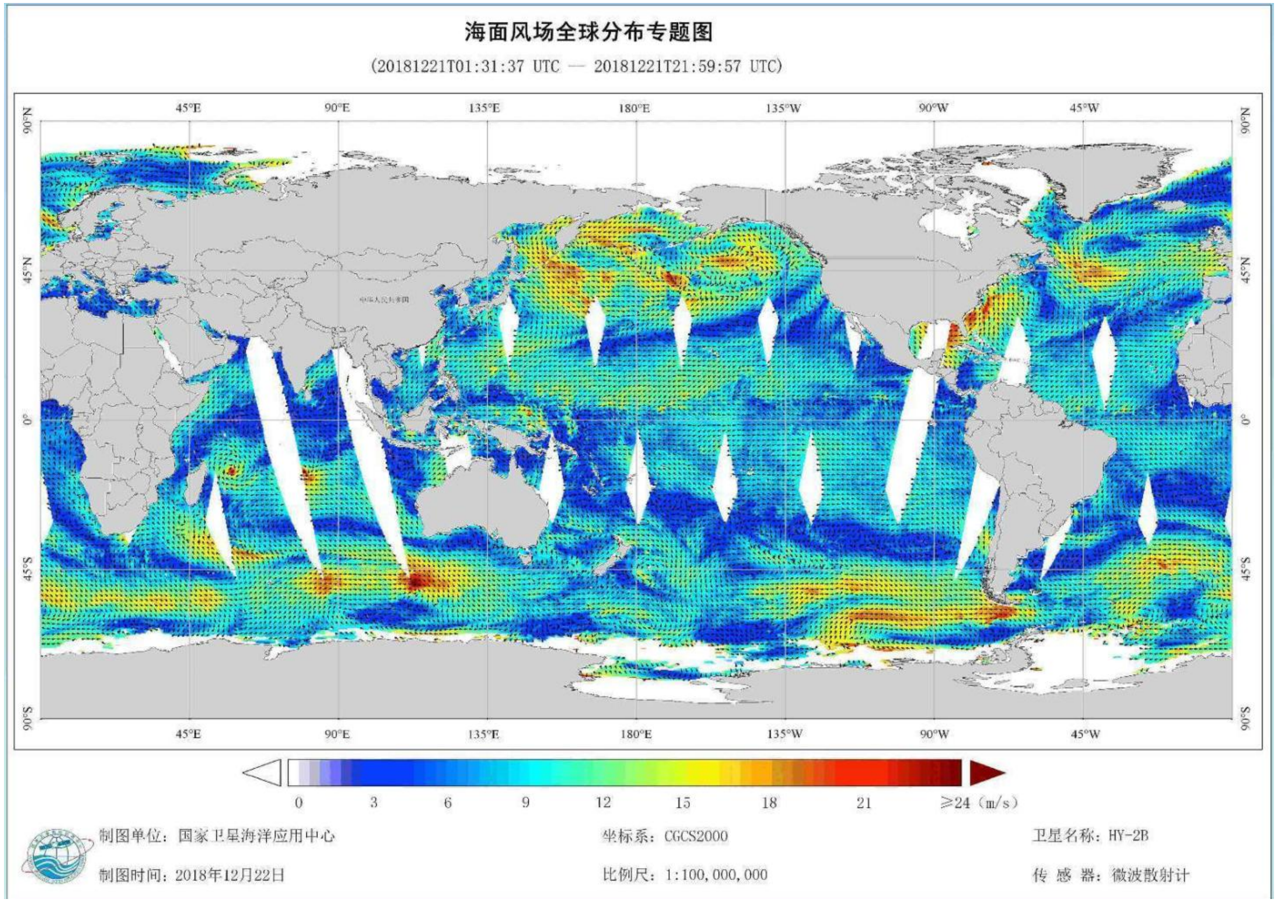
Sea Surface Height

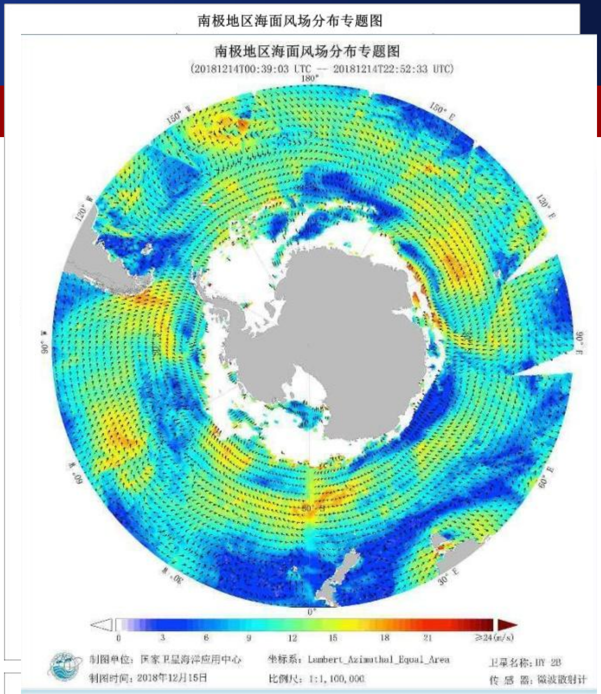
Significant Wave Height

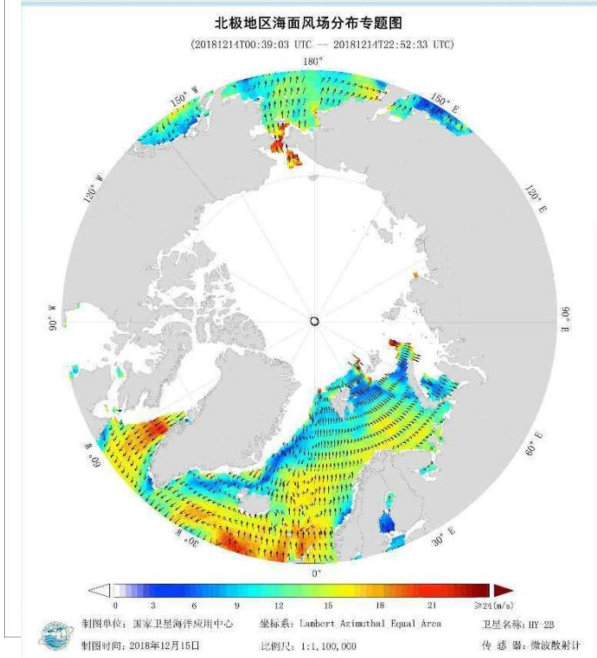


Current Status

- Example products of Scatterometer



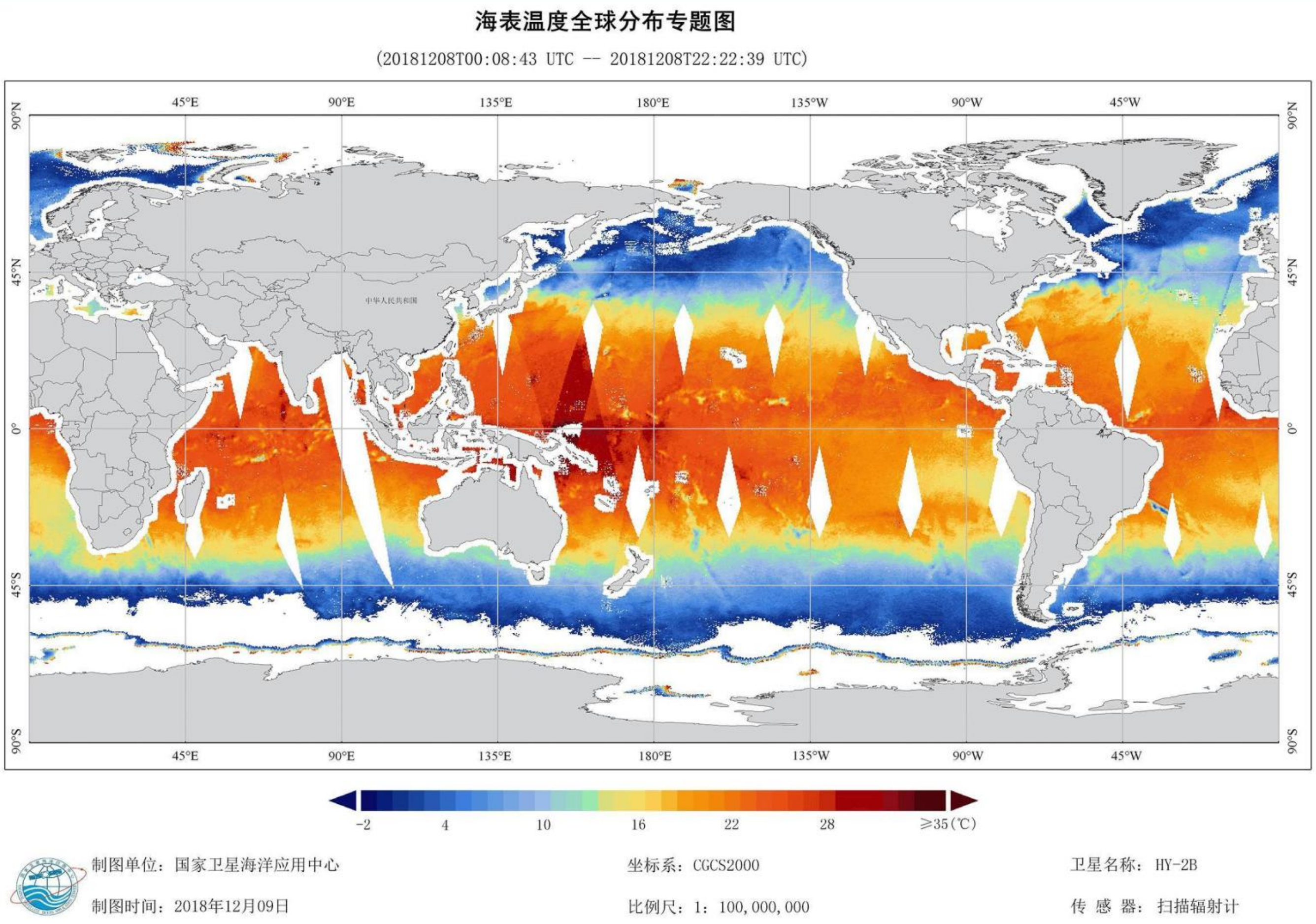


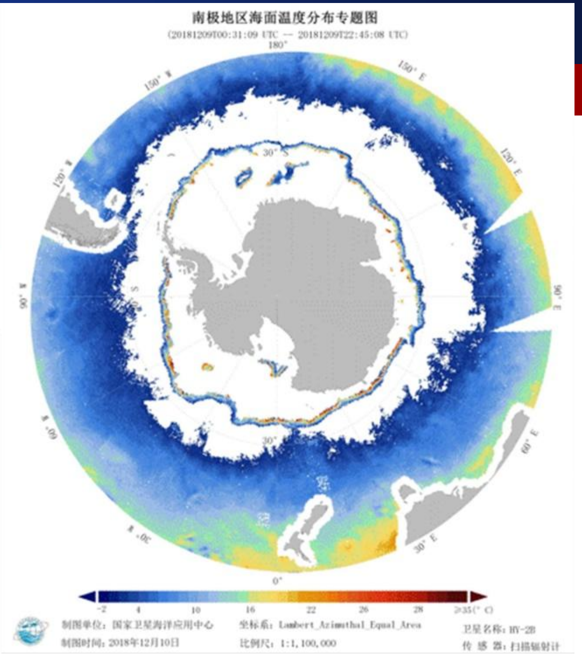


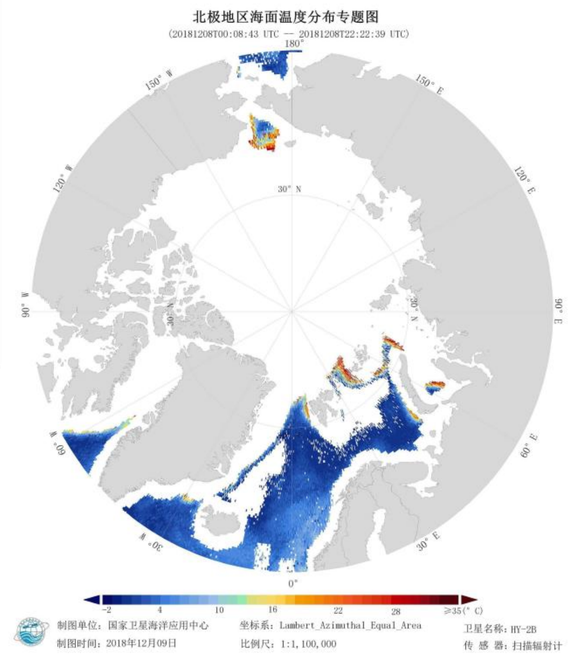
Sea Surface Winds of Global, Antarctic, Arctic

Current Status

❖ Example products of Radiometer





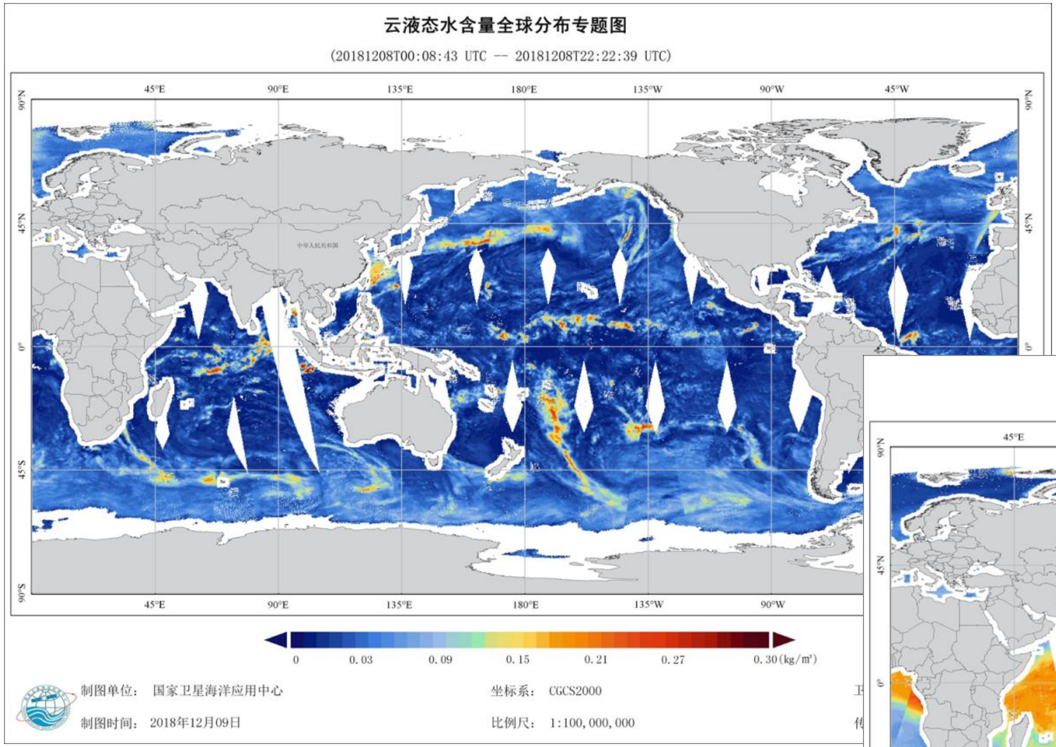


Sea Surface Temperature of Global, Antarctic, Arctic

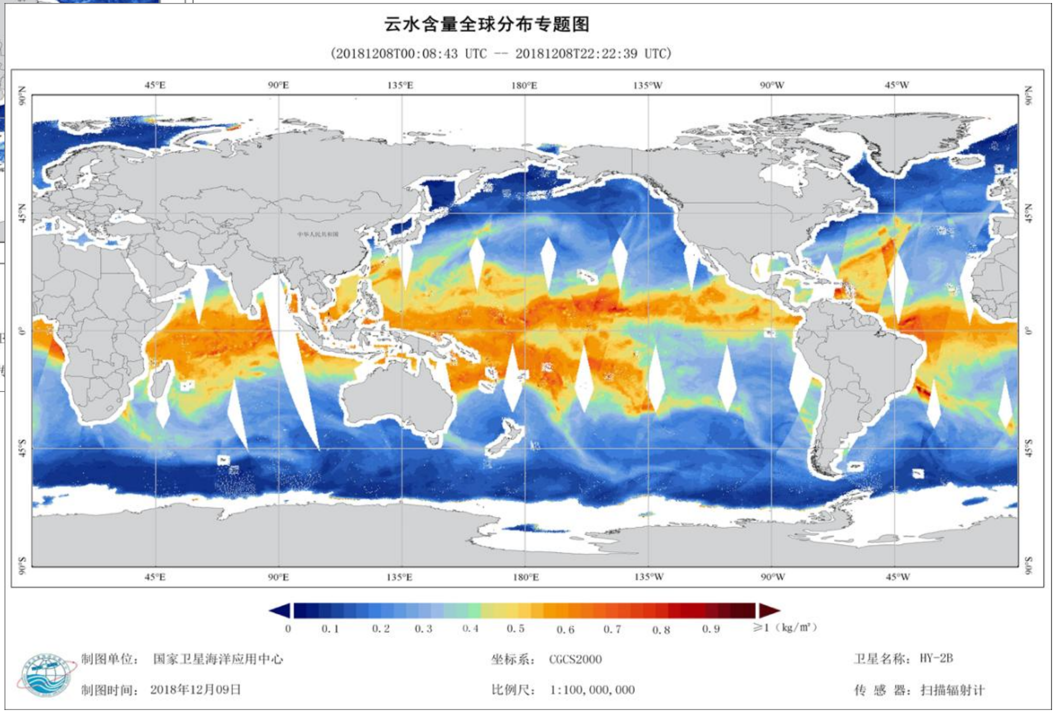
Current Status

- Example products of Radiometer

Cloud Liquid Water

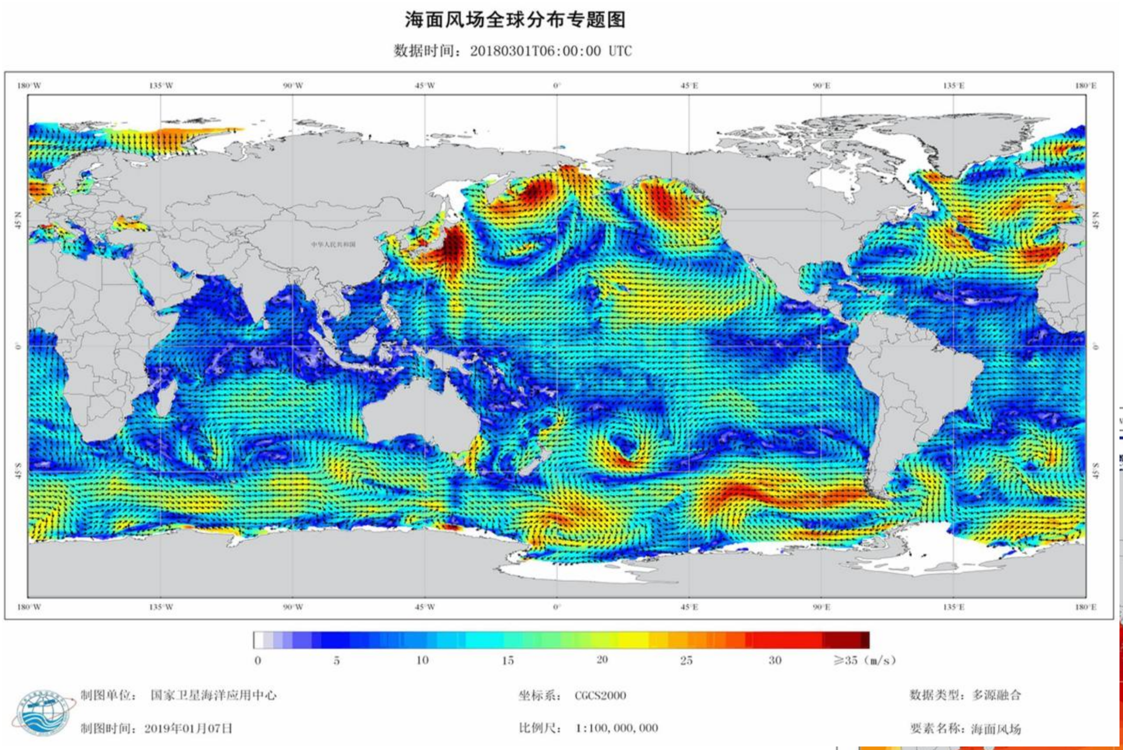


Water vapor



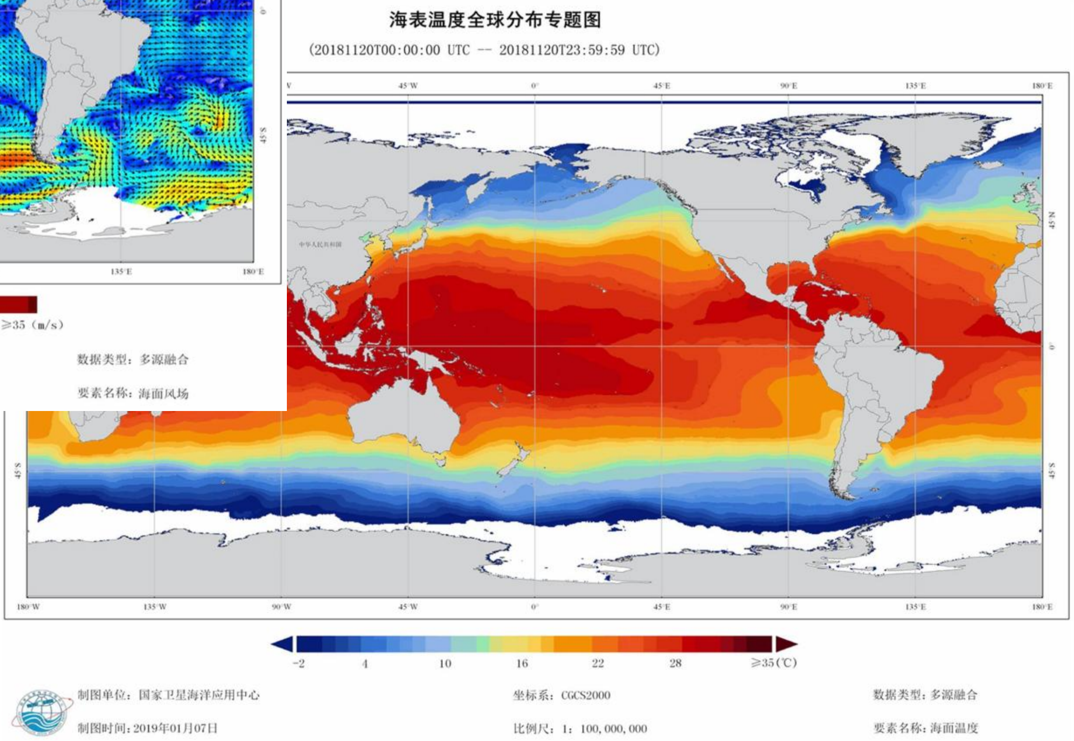
Current Status

❖ Examples of Fusion Products



Sea Surface Winds

Sea Surface Temperature



Current Status

- The main product evaluation results for now

Sensor	Satellite	Significant Wave Height	Sea Surface Height	Sea Surface Wind Speed
ALT	HY-2B	0.34m	4.58cm	0.89m/s
	HY-2A	0.42m	6.30cm	1.98m/s

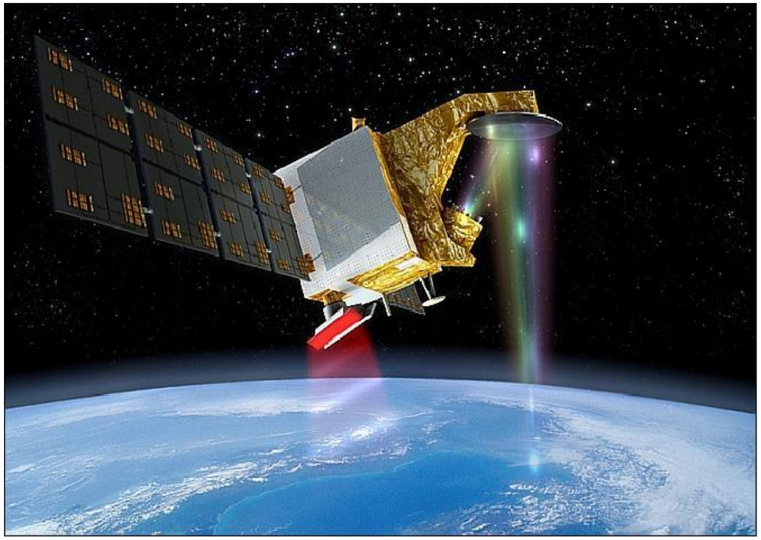
Sensor	Satellite	Sea Surface Wind Direction	Sea Surface Wind Speed	remark
SCA	HY-2B	12.9°	1.0 m/s	Under wind speed >4m/s condition
	HY-2A	19.6°	1.4 m/s	

Sensor	Satellite	Sea Surface Temperature	Sea Surface Wind Speed	Water vapor	Cloud Liquid Water
SMR	HY-2B	0.80K	1.00m/s	0.95mm	0.030mm
	HY-2A	1.50K	1.46m/s	1.18mm	0.033mm

Current Status

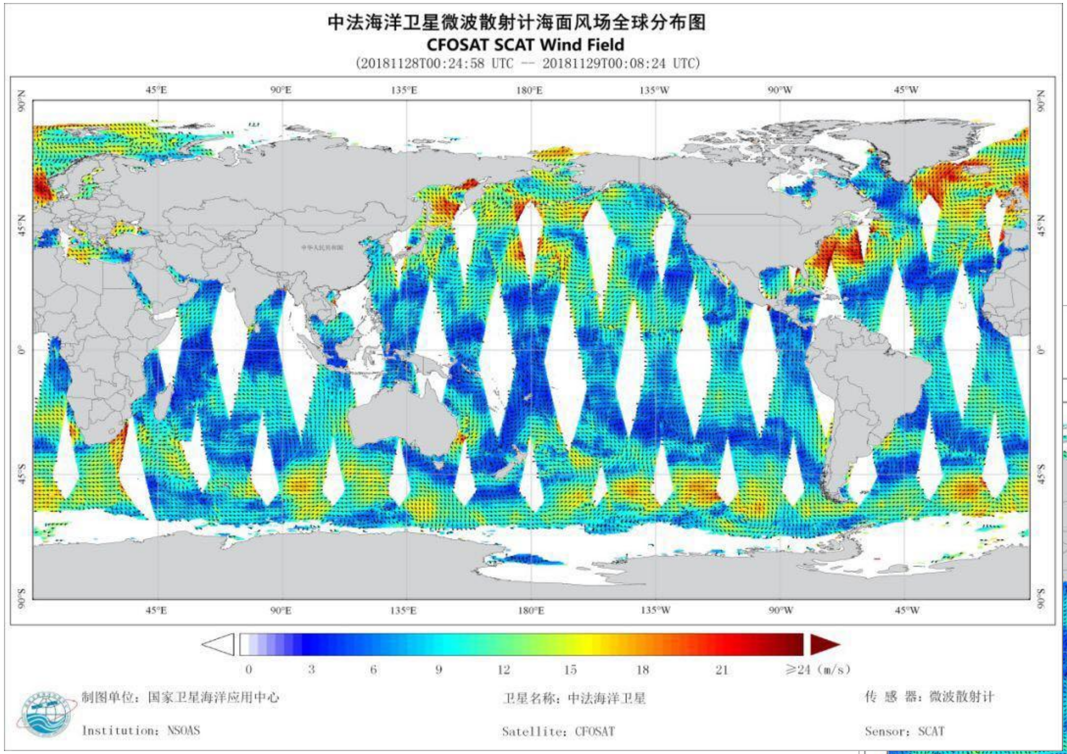
❖ CFOASAT

- Chinese-French Oceanography Satellite is a joint mission of China and France with the goal to monitor the ocean surface winds and waves
- Main payloads
  - SCAT (Rotating Fan-beam Scatterometer)
  - SWIM (Surface Waves Investigation and Monitoring instrument)
- Launched on 29 Oct., 2018
- Declared operational in Feb. 2020

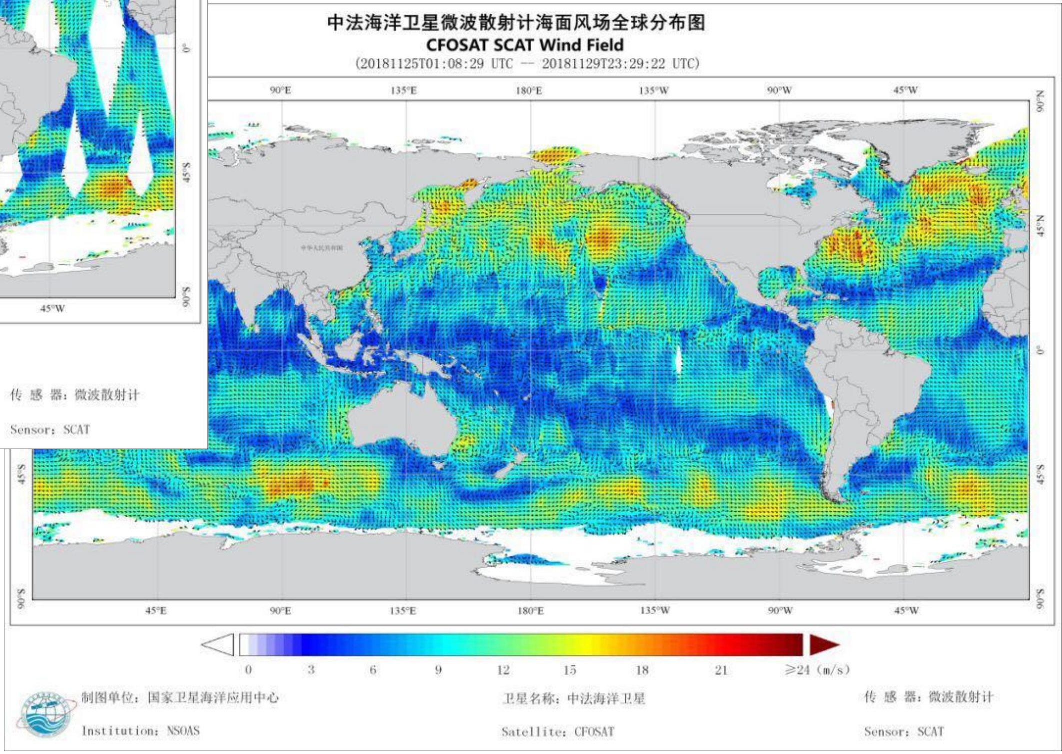


Current Status

- Example Products of CFOSAT



Sea surface wind products of one day and five days

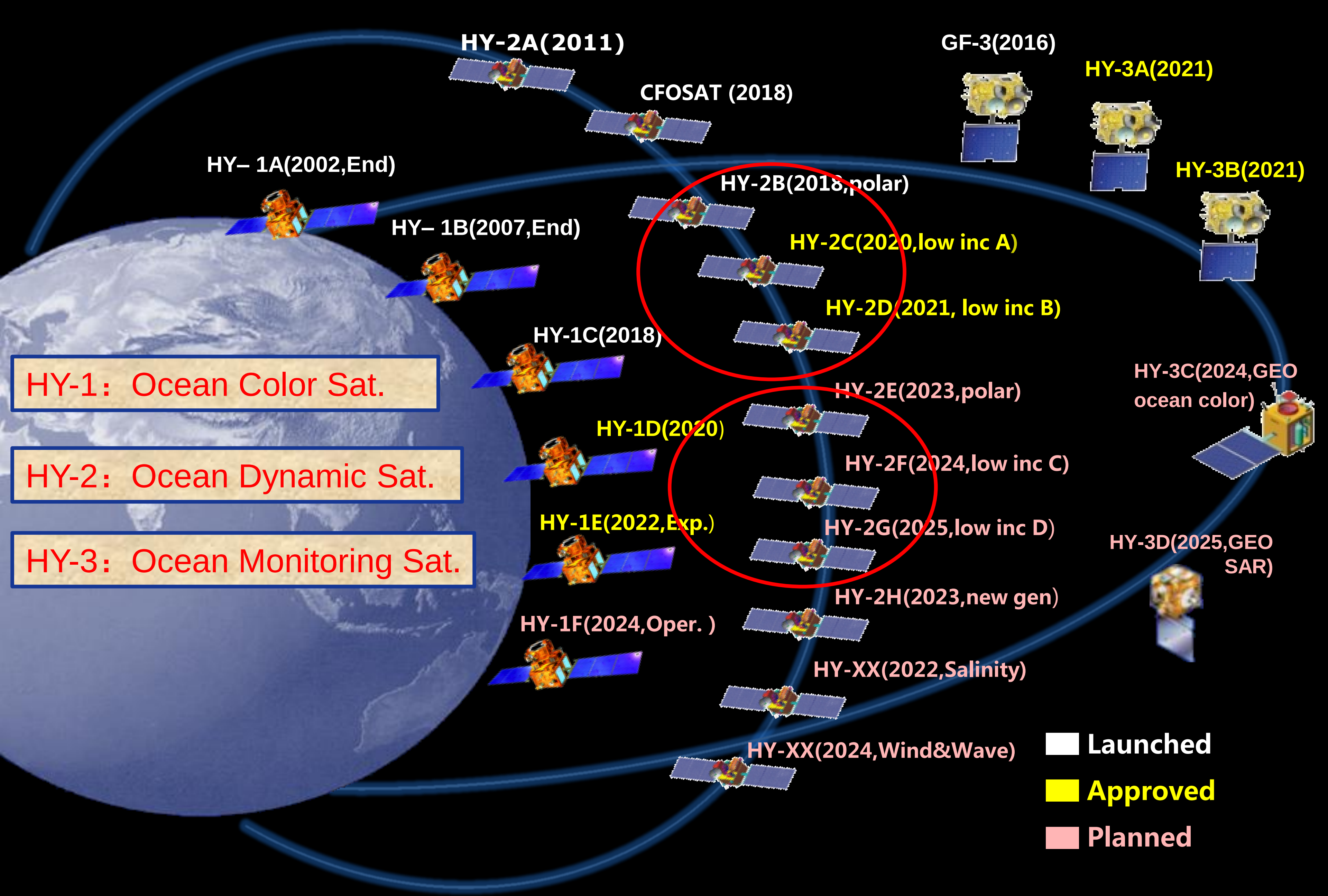


Outlines

Background & Current Status

Future Plans

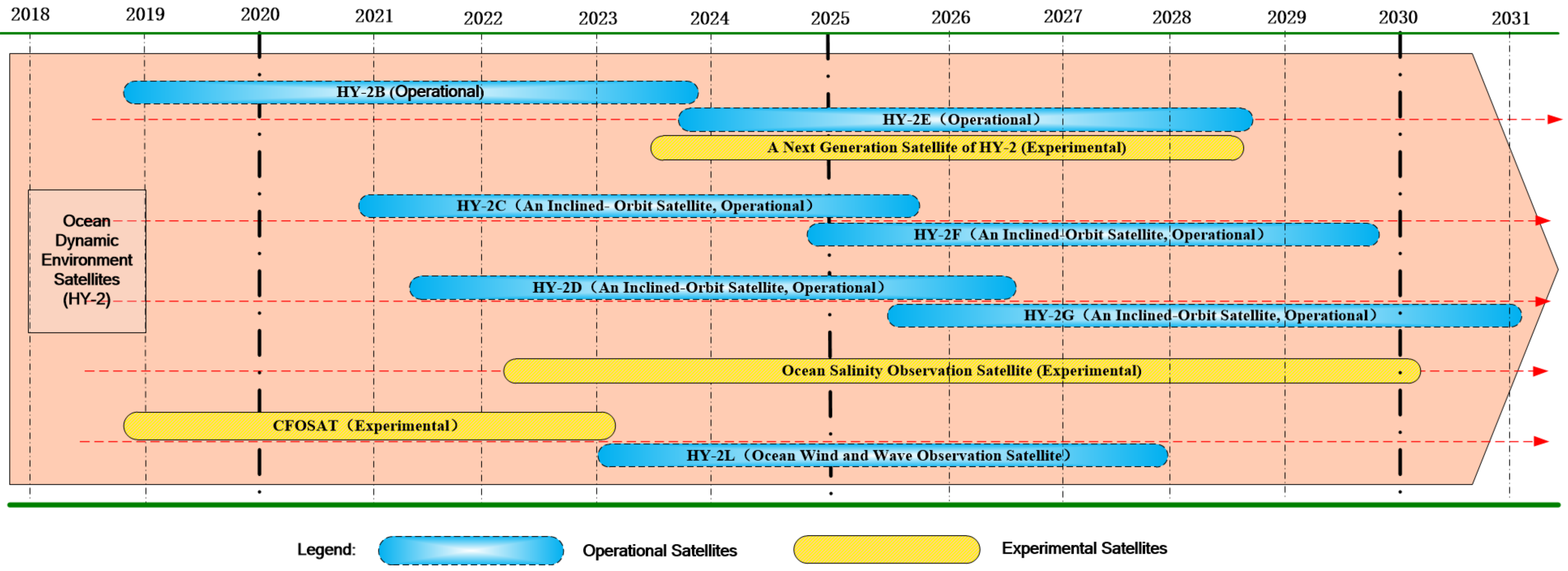
China has programmed to launch 15 Haiyang Satellites in the following 6 years including 8 HY-2 series satellies.



Future Plans

HY-2 Series Satellites

- Maintaining at least 5 satellites in orbit.

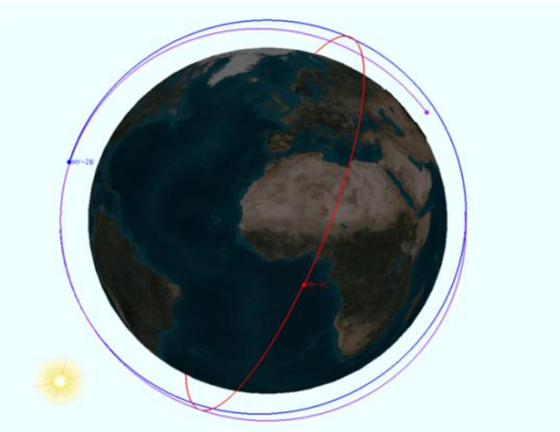


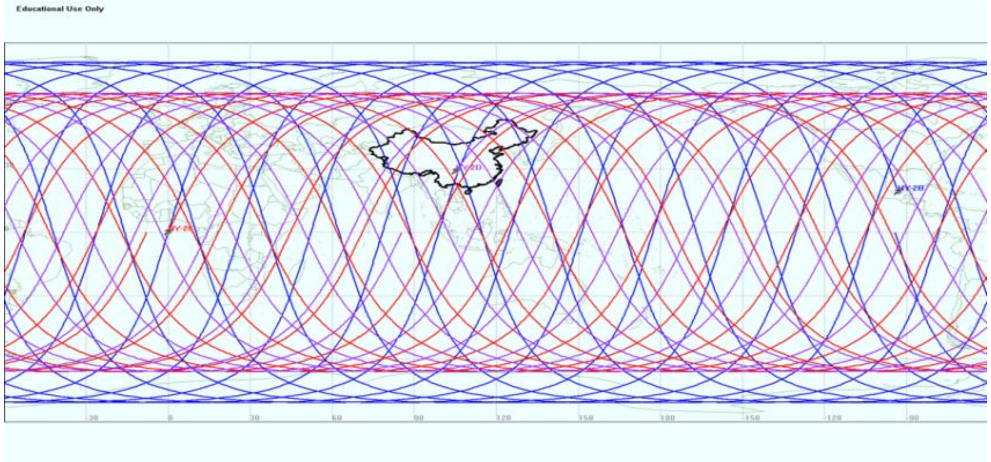
Future Plans

❖ HY-2C、HY-2D

- Two inclined orbit satellites, together with the polar orbit satellite HY-2B, form a three satellites constellation
- Main payloads (no SMR)
  - Radar Altimeter (RA)
  - Microwave Scatterometer (MS)
  - Calibration Microwave Radiometer (CMR)

Ground traces of the three satellites for one day



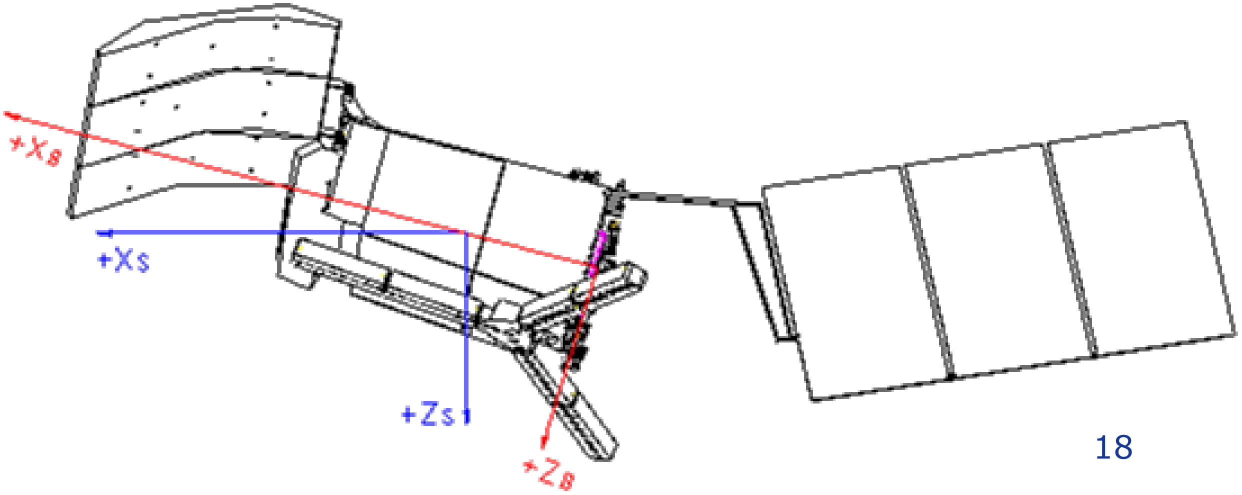


Future Plans

❖ An Ocean Salinity Observation Satellite

- To provide the sea surface salinity, sea surface temperature, sea surface roughness products
  - An experimental polar-orbit satellite
- Main payloads
  - Synthesis Aperture Microwave Radiometer, L Band.
  - Active and Passive Microwave Detector (Scatterometer, L Band; Radiometer, C/K Bands)

- The launch is planned for 2022

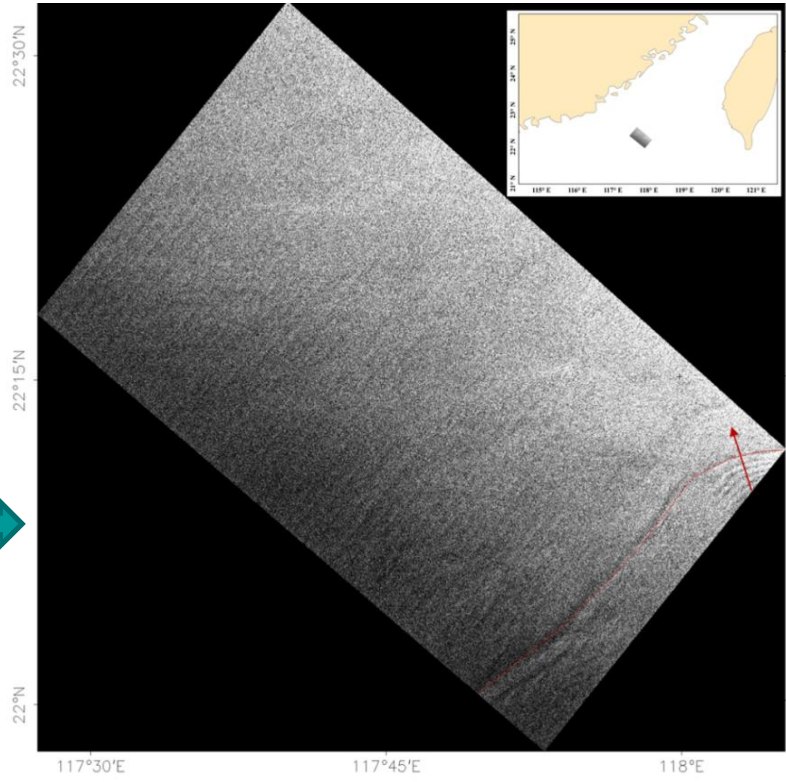


Future Plans

A Next Generation Satellite of HY-2

- A polar orbit satellite with a more powerful ability to measure ocean dynamic environment parameters, and it especially improves the resolutions of sea surface height products
- Main Payloads
  - Interferometric Radar Imaging Altimeter
  - Dual-Frequency Qual-Pol Scatterometer
  - Multichannel Qual-Pol radiometer
- The launch is planned for 2023

Space Lab, Tiangong 2
Imaging radar altimeter,
12th,Aug.,2017



Future Plans

- HY-2E、HY-2F、HY-2G
  - The successor missions to HY-2B、HY-2C and HY-2D, respectively.
  - Three operational satellites
  - They will form a new three satellite constellation.

Thanks

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